

**IMPROVING TEACHER QUALITY**  
**Arts and Science Integration**

**Visual Art and Earth Science**

**Grade 5**

Spring 2013

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 5  
VISUAL ART AND LIFE SCIENCE**

**Abstract Cross Sections: Celery  
Lesson # 1**

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1*

**CONTENT STANDARDS**

**Visual Art**

**2.4** Create an expressive abstract composition based on real objects.

**Life Science**

**LS2a** Students know many multicellular organisms have specialized structures to support the transport of materials.

**LS2e** Students know how sugar, water and minerals are transported in a vascular plant.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What is an abstract work of art?
- How can I use the shapes of a vascular plant to plan a composition in art?
- How do sugar, water and minerals move through a vascular plant?
- How does studying and drawing a cross section of a vascular plant help you learn about xylem and phloem?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to.....*)

- Demonstrate understanding of abstract works of art.
- Plan an abstract composition using the shape of a cross section of colored celery.
- Demonstrate understanding of how sugar, water and minerals are transported in vascular plants.

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Abstract:** Relating to art with subject matter that is simplified or distorted with little or no attempt to appear realistic
- **Composition:** The organization of elements in a work of art.
- **Contour:** an outline, especially one representing or bounding the shape or form of something
- **Motif:** A unit repeated over and over in a pattern. The repeated motif often creates a sense of rhythm.
- **Shape:** A two-dimensional area or plane that may be open or closed, free-form, geometric or natural. It can be found in nature or is made by humans.

**Life Science Vocabulary**

- **Cross section:** Cuts across an object that expose its internal structure
- **Nutrient:** A chemical found in food that helps keep an organism alive and active.
- **Micrograph:** A photo taken by means of a microscope.
- **Phloem:** Long cells through which nutrients, such as sugars, are distributed in a plant.
- **Photomicrography:** Photos taken through the lens of a microscope.

- **Sugar:** The nutrient that cells use for energy
- **Transport:** To move or carry
- **Vascular plant:** A plant with an internal system of tubes for transporting nutrients to its roots, stems and leaves.
- **Water:** A liquid earth material made of hydrogen and oxygen.
- **Xylem:** The hollow cells of a plant that transport water and minerals to plant cells.

### MATERIALS

- Two or more images of cross sections of vascular plants
- 4" x 6" white construction paper, one per student
- Pencil and eraser, one per student
- Cross section of colored celery, one per student
- 12" x 18" black construction paper, one per student
- White lead pencil or white chalk, one per student
- Science notebook, one per student

### RESOURCES

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1*
- *Portfolios Grade Five*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Abstraction: page 8
  - Observational drawing: pages 2, 3, 6, 7
- Internet:
  - Micrograph of Xylem and Phloem Cross Sections:
    - Die Wunderkanone: Abenteuer Mikrowelt (German language website) <http://web.me.com/eckhard.voelcker/Animation/Straeucher/Overview.html>
    - Fern Stalk Cross Section: <http://www.olympusmicro.com/galleries/abramowitz/pages/fernstalkxsectionlarge.html>
    - Vascular Plants of the Gila Wilderness: [http://www.wnmu.edu/academic/nspages/gilafloora/agave\\_parryi.html](http://www.wnmu.edu/academic/nspages/gilafloora/agave_parryi.html)
    - Brilliantly Colored Plant Sections Bring the Beauty of Common Plants into Focus: <http://www.labgrab.com/gallery/plant-sections-full>
- IMC  
2441 Cardinal Lane, San Diego, CA 92123

### PREPARATION *(To be completed prior to the lesson)*

- FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1 must be completed prior to this lesson. In Part 1, #14 teachers are asked to create cross section slices of the colored celery. Create enough cross sections for each student in the class. These cross sections will become the central shape used in the work of art.

### WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

- Display Image #1 from the end of this lesson, *Tannenspross (fir shoot)* <http://web.me.com/eckhard.voelcker/Blog/Blog.html> by Eckhard Volcker, Berlin, Germany, in an area easily seen by all students.
- Instruct students to visually examine the image silently for one minute.
- Ask:
  - *What elements of art do you see?* [line, shape, color, texture, space and value]
  - *What **shapes** do you see?* [circles, stars, half circles, hexagon, free shapes]
  - *What colors do you see?* [yellow, red, green, orange, white]
  - *How are the **shapes** and colors organized?* [radial design]
  - *Who do you think created this work of art?* [Eckhard Volcker in 2009]
  - *How?* [photomicrography of a fir tree shoot]
  - *Remember how we looked at **photomicrography** in Visual Art Physical Science Lesson 1? Then we were looking at the surface of inorganic compounds like nickel sulfate. What is*

**photomicrography?** [photos taken through the lens of a microscope]

- Display Image #2 from the end of this lesson, *Phloem and Xylem Diagram* by David Webb.
- Say:
  - This is a diagram of a **cross section** of a **vascular plant**. A “**cross section**” is a lateral or an across cut. After the cut is made the **cross section** is placed under a microscope and examined at a cellular level.
  - This diagram shows the size and the placement of the **xylem** and **phloem**.
  - What do you notice about the **xylem** and **phloem**? [**xylem** tends to be thicker and toward the center of the plant, **phloem** tubes seem thinner and surround the **xylem**]
- Display Image #3 from the end of this lesson, *Butterfly Bush* by Eckhard Volcker.
- Ask:
  - Where is the center of this **cross section** of a plant? [not in the photograph, off to the lower left because of the radial pattern seen]
  - Which **shapes** do you think are the **xylem**? Why? [larger circles toward the bottom left, because they are thicker and more toward the center of the stem]
  - Which shapes do you think are the **phloem**? Why? [smaller circles, in an arch from upper left to lower right, because they are thinner and surround the **xylem**]

**MODELING** (*Presentation of new material, demonstration of the process, direct instruction*)

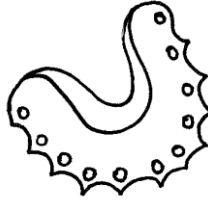
- Distribute one 4 x 6 piece of white construction paper, a pencil and eraser to each student.
- Also distribute one **cross section** of colored celery from the FOSS Kit, Grade 5, Life Science: Living Systems, Investigation 2, Part 1 to each student.
- Demonstrate how and instruct students to draw the **contour** or outside **shape** of the celery **cross section** on the 4” x 6” white construction paper under the document camera.
  - Relate the celery **shape** to a letter “C” with concave or scalloped sections on the outside edges.



- Show the thickness of the **cross section** of the celery.



- Add circles toward the outside edge of the **shape** representing the **xylem** that is now colored from the experiment.
- Remind students that the **xylem** is colored because the dye was **transported** or moved up the plant with the **nutrients, water** and the minerals.



- Allow students a few minutes to practice drawing this celery **shape** at least three more times on this small sketch paper.
- Distribute one 12" x 18" piece of black construction paper and a white colored pencil to each student.
- Say:
  - *Today, we are going to plan an **abstract** painting of celery.*
  - **Abstract** means that we are going to paint the celery in a distorted or unexpected way.
  - We are going to enlarge the celery **shape** and we are going to shrink the celery **shape**.
  - We are going to paint the celery **shape** in a way that many people may not recognize as celery.
  - The celery itself is already a little **abstract** because we have turned it into an unexpected color during our experiment!
  - Somewhere on your black paper draw a celery **shape** like one of the sketches you practiced on the white construction paper. Use the white colored pencil and make the drawing about the same size and same **shape**.
- Demonstrate how to draw the celery **shape** with the white colored pencil on the black construction paper about the same size as the sketches made previously.
- Check to make sure all students have accomplished this first step in the **abstract** painting **composition** plan.
- Say:
  - *Now that we have all drawn one celery **shape**, we are now going to draw it several more times in different ways.*
  - *This time, draw the celery **shape** somewhere on your paper 6 inches or more in size.*
  - *Your white sketch paper is 6 inches on the long side, so use it as a guide.*
  - *Create your celery **shape** as big as you can, but don't let it touch the first celery **shape**.*
  - *You may decide to turn your celery shape in a different direction.*
  - *Don't forget to draw the circles representing the **xylem** where the dye was **transported** upward in the stalk of celery. The circles representing the **xylem** should be larger too.*
- Demonstrate how to draw the celery **shape** at least 6 inches in size somewhere on your example.
- Check to make sure all students have accomplished this step in the **abstract** painting **composition** process to ensure success.
- Say:
  - *Let's draw the celery **shape** again, but make it about 1 inch in size.*
  - *Remember that you are going to have to paint this **shape** during our next lesson, so don't make it too small.*
  - *Make sure this **shape** does not touch either of the other two shapes already on the paper.*
- Demonstrate how to draw the celery shape about 1 inch in size somewhere on your example.
- Check to make sure all students have completed 3 celery cross section shapes, one large, one medium and one small.
- Say:
  - *Let's make one more celery **shape** together as a class. This time let's make the **shape** appear like it is behind one of the **shapes** we have already drawn.*
- Ask:
  - *How can we do that? How can we make the next **shape** appear like it is behind one of the other **shapes**? [part of the distant shape will not be visible]*
- Demonstrate how and instruct students to create a fourth celery **shape** that looks like it is behind one of the other **shapes**.

**GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- Say:
  - Students, you now have a few minutes to add more celery **shapes** to your **abstract painting composition**.
  - You may draw the **shapes** in different sizes, but make sure they are no smaller than 1 inch. Tiny celery **shapes** will just be too hard to paint effectively in the next lesson.
  - Make sure you repeat the celery **motif** only.
  - **Motif** is a new word today. It means to repeat a **shape** or image to create a pattern or to make meaning or represent a feeling.
  - Is it possible to use these celery **shapes** to make someone who is looking at your composition, feel something or think something you intended them to feel or think? Consider that as you finish up your **abstract painting composition**.
- Conference with students as they add more celery **shapes**.
- Instruct students to write their names on the back of the construction paper using the white colored pencil.
- Collect the drawings, store art making materials appropriately.
- Save the **cross sections** of celery (in a refrigerator) for the next lesson.

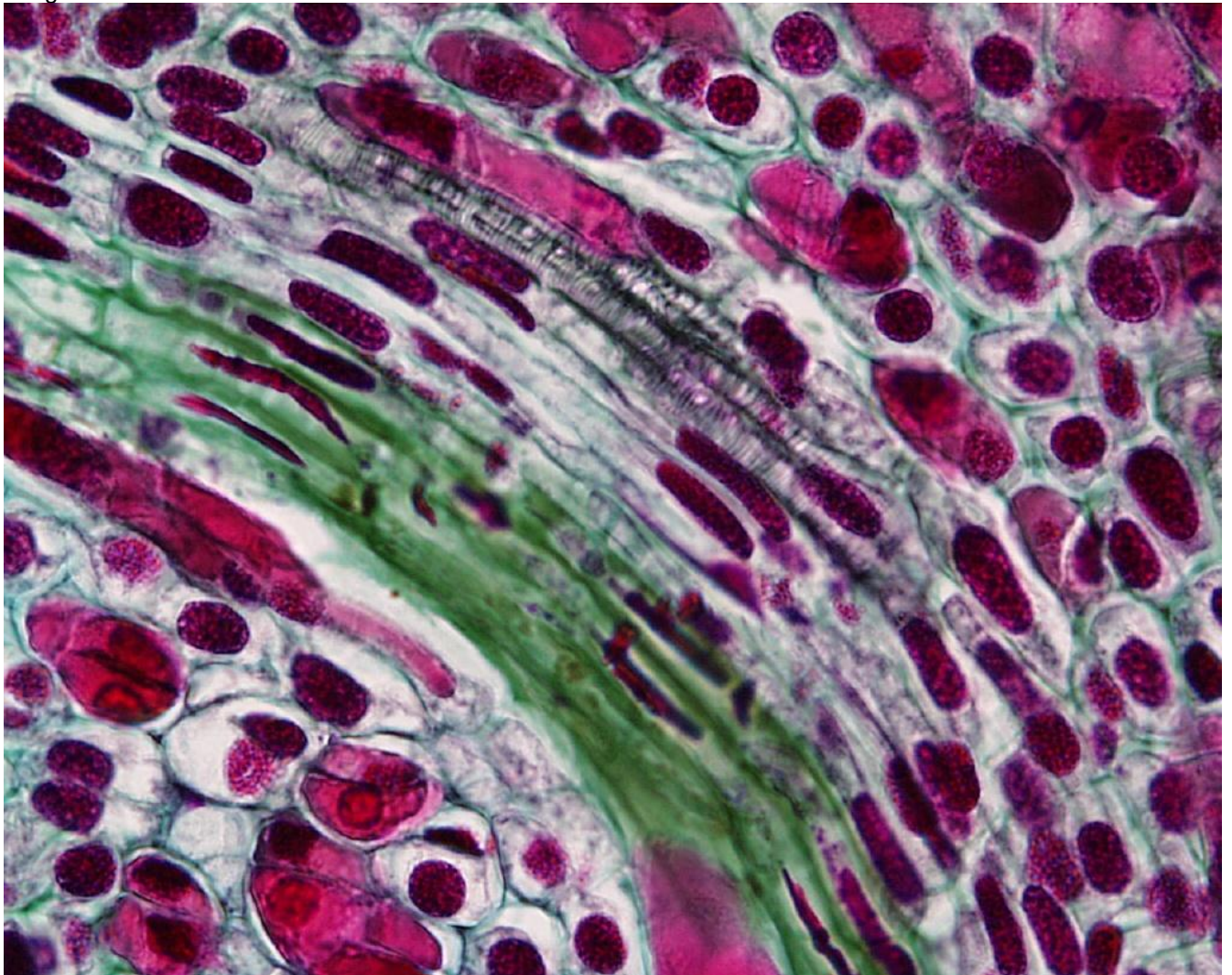
**DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- Science Notebook Prompt: How does studying and drawing a **cross section** of a **vascular plant** help you learn about **xylem** and **phloem**?

**EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Encourage students to find **abstract** design in nature and in the environment.

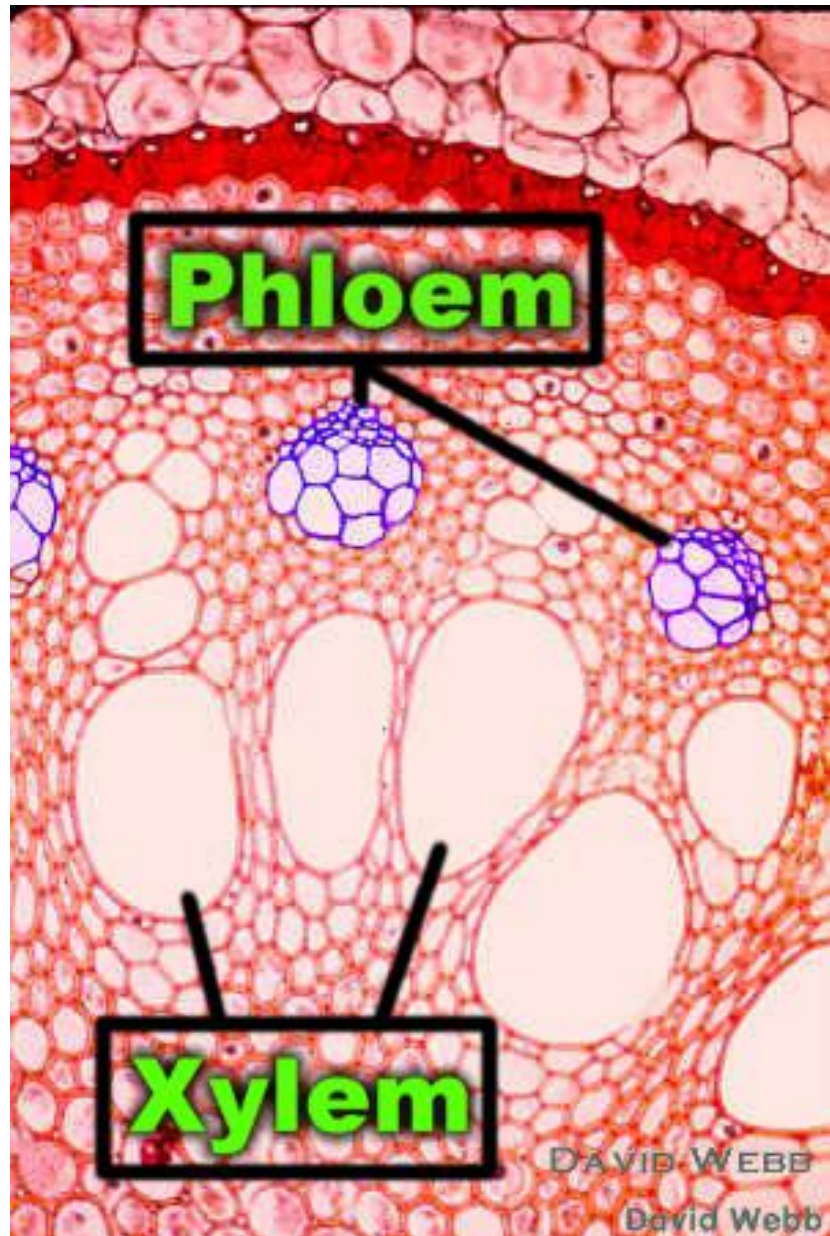
Image #1



Pine Procambium

<http://sols.unlv.edu/Schulte/Anatomy/Stems/Stems.html>

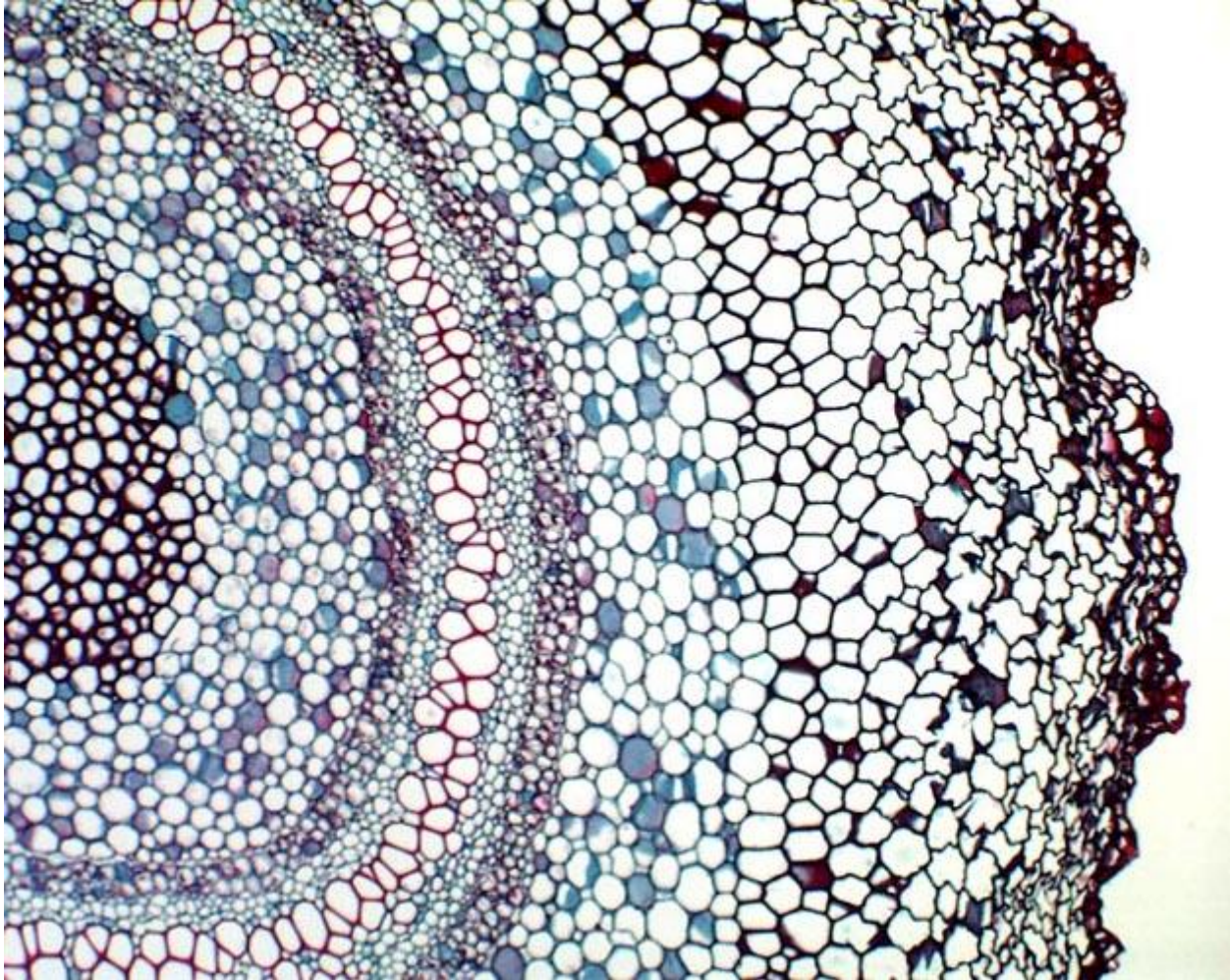
Image #2



<http://www.biologie.uni-hamburg.de/b-online/library/webb/BOT201/Angiosperm/MagnoliophytaLab99/MagnoliosidaLab.htm>



Image #3



Consider Illustrations #1 and #2....Where is the center of this plant?

Which shapes do you think are the xylem? Why?

Which shapes do you think are the phloem? Why?

This is a vascular bundle of fern rhizome. Microscopic cross-section of xylem and phloem cells by Michael Clayton, [urbangram.net](http://urbangram.net).

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 5  
VISUAL ART AND LIFE SCIENCE**

**Abstract Celery  
Lesson # 2**

*FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1*

**CONTENT STANDARDS**

**Visual Art**

**2.4** Create an expressive abstract composition based on real objects.

**Life Science**

**LS2a** Students know many multi-cellular organisms have specialized structures to support the transport of materials.

**LS2e** Students know how sugar, water and minerals are transported in a vascular plant.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What is an abstract work of art?
- How can I use a cross section shape and color of dyed celery as inspiration to create a work of abstract art?
- What is xylem and phloem?
- What is sap?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to...*)

- Demonstrate understanding of abstract works of art.
- Complete an abstract painting using the shape and color of a cross section of dyed celery.
- Demonstrate understanding of the functions of xylem and phloem in vascular plants.
- Describe sap in a vascular plant.

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Abstract:** Relating to art with subject matter that is simplified or distorted with little or no attempt to appear realistic, little or no attempt is made to represent images realistically.
- **Palette:** A flat surface on which you prepare paints for use in an artwork; a particular range, quality or use of color.
- **Tempera:** A paint in which the albuminous or colloidal medium such as egg yolk, is the medium instead of oil.
- **Tint:** Color lightened with white added to it.

**Life Science Vocabulary**

- **Sap:** Sugar-rich liquid transported by phloem.
- **Phloem:** Long cells through which nutrients, such as sugar, are distributed in a plant.
- **Vascular Plant:** A plant with an internal system of tubes for transporting nutrients to its roots, stems

and leaves.

- **Xylem:** The hollow cells of a plant that transport water and minerals to plant cells.

### MATERIALS

- 4" x 6" black construction paper, one per student
- white colored pencil, one per student
- Cross section of colored celery, one per student
- 12" x 18" black construction paper with celery designs from Visual Art/Life Science Grade 5 Lesson 1, one per student
- white, green and red tempera paint
- Size #8 and large round paint brushes
- White paper or foam plate as palette, one per student
- *Ginko Leaves on a Purplish Background* by Hellenne Vermillion or an abstract painting of leaves on a dark background
- Science notebook, one per student

### RESOURCES

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1*
- *Portfolios Grade Five*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Abstract: page 8
  - Leaves: page 95
  - Painting processes: page 134
- Internet:
  - Abstract Paintings of Leaves
    - *Ginko Leaves on a Purplish Background* by Hellenne Vermillion <http://vermillionart.blogspot.com/2011/05/green-ginko-leaves-on-purplish.html>
    - *Abstract Painting with Leaves* by Martin Missfeldt <http://www.martin-missfeldt.com/art-pictures/oilpaintings-romantic-nature/abstract-painting-leaves.php>
    - *Abstract Leaves* by Karla Gerard <http://fineartamerica.com/featured/leaves-abstract-karla-gerard.html>

### PREPARATION *(To be completed prior to the lesson)*

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 1* must be completed prior to this lesson. In Part 1, #14 teachers are asked to create cross section slices of the colored celery. Create enough cross sections for each student in the class. These cross sections will become the central shape used in the work of art.
- Visual Art/Life Science Grade 5, Lesson 1 must be completed before this lesson. Students will have prepared a 12" x 18" black construction paper with a variety of celery shapes drawn in white colored pencil.

### WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

- Distribute a 4" x 6" piece of black construction paper to each student.
- Instruct students to write their name on the back of this paper using white colored pencil.
- Demonstrate how and instruct students to set up their work area with the following: paper towel, paper or foam plate to be used as a **palette**, a # 8 paintbrush, a larger round paintbrush, and water in a container.
- Distribute about 2 tablespoons of white **tempera** paint and 1 teaspoon of green **tempera** paint on opposite sides of each palette.
- Say:
  - *The paper plate you have in front of you will be called the "palette" during this class.*
  - *A **palette** is a flat surface on which you prepare paints for use in an artwork; a particular range, quality or use of color.*
  - *Please roll up sleeves or take off sweaters before painting begins.*

- Demonstrate how and instruct students to practice the following painting skills:
  - Mix white and a small amount of green **tempera** to create a light tint of green like natural celery. Mixing white with a color creates a **tint** of the color. “Celery” is a **tint** of green.
  - Use the smallest brush to create a circle, a long stroke or line and a square.
  - Use the largest brush to create a circle, a long stroke or line and a square.
  - With each brush, make a series of short strokes touching each other.
  - With each brush, make a series of dots covering a 1” x 1” area.
- Ask:
  - *What did you learn about the two brushes?* [different control and thickness of lines, create different textures, cover different amounts of space]
  - *What did you learn about using light colored paint on black construction paper?* [the black dye in the paper sometimes mixes in with the paint to make it darker or browner, smearing the brush around on the surface of the paper makes the paint darker.]
  - *How can you use this knowledge when you paint the **abstract** celery drawn in the last lesson?* [use the large brush to cover large areas quickly, use the small brush to paint edges, details]

**MODELING** (*Presentation of new material, demonstration of the process, direct instruction*)

- Distribute the 12” x 18” black construction paper with white colored pencil design from Visual Art/Life Science Grade 5, Lesson 1 to each student
- Demonstrate how and instruct students to paint the mixed “celery” colored **tempera** inside the drawn celery shapes.
  - Begin painting toward the top of the paper to avoid resting hand or wrist on wet areas of paint.
  - Outline the shapes with a thick edge of paint and then fill the center.
  - Try to paint over large areas only once or twice and not repeatedly. The black dye in the paper will seep into the paint and cause it to darken, turn brownish or streak.
  - Turn paper as needed to fill in the celery shapes.
  - Use the brush that creates the desired effect in the most effective way.
  - Clean the brushes thoroughly in water and lay them on the paper towel until needed again.
- Let paint dry a few minutes and apply an additional coat of light green to brighten color and create a more opaque effect.

**GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- While the second layer of light green paint is drying completely, distribute about a teaspoon of the color of tempera paint that coincides with the food coloring used in Investigation 2: Part 1 Step 8 to each student.
- Ask:
  - *What do we know about the **xylem** tubes in a vascular plant?* [start at the roots and end in the leaves, water and minerals flow through the **xylem** to the cells, water flows up the vascular plant through the **xylem**]
  - *How can we represent the **xylem** in our paintings?* [colored circles placed toward the outside edge of the celery as we observe the celery cross sections]
  - What is **phloem**? [tubes in a plant that go from the tips of leaves down to the roots]
  - What does **phloem** do in a vascular plant? [creates a system of tubes that moves **sap** for storage in a vascular plant]
  - What is **sap**? [excess sugar made in leaves, sugar-rich liquid transported by phloem]
  - Does celery have **sap**? [yes, all vascular plants have sap]
- Instruct students to paint the colored circles representing the **xylem** tubes on each of the **abstract** celery cross-sections.
- Say:
  - *Use the knowledge you gained at the beginning of this lesson about different paintbrushes when you paint the **xylem**.*
- Place practice sheets and works of art in a drying area.
- Direct students to clean up and store materials appropriately.
  - Make sure all paintbrushes are cleaned thoroughly. Use a little bit of liquid soap on the bristles and rinse until all color is gone. Place brushes with bristles up to dry.

- Fasten lids to **tempera** paint containers tightly and clean off any excess paint at the opening for easy use next time.

**DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- Project or display *Ginko Leaves on Purplish Background* by Hellenne Vermillion or an abstract work about leaves on a dark background. (See end of this lesson for image and link to internet site.)
- On a chart paper, white board or electronic display, make two columns. At the top of one write the word “differences”, on the top of the other column, write the word “similarities”
- Allow one minute while students visually examine the work of art silently.
- Ask:
  - *How is this **abstract** painting the same or similar to the painting we just created?*
  - *How is this **abstract** painting different?*
- Write student comments into the appropriate column.
- A photograph of ginko leaves appears after the end of this lesson for reference.
- Science Notebook Prompt: *How does my abstract painting of the cross section of celery show my understanding of xylem and phloem?*

**EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Encourage students to identify other abstract works of art that demonstrate or illustrate scientific knowledge.



*Ginko Leaves on Purplish Background*

By: Hellenne Vermillion

<http://vermillionart.blogspot.com/2011/05/green-ginko-leaves-on-purplish.html>



Photograph of ginkgo leaves

[http://www.geog.ucsb.edu/img/news/2008/ginkgo\\_leaf.JPG](http://www.geog.ucsb.edu/img/news/2008/ginkgo_leaf.JPG)

**ITQ ARTS AND SCIENCE INTEGRATION  
GRADE 5  
VISUAL ART AND LIFE SCIENCE**

**The Plant Food Factory  
Lesson # 3**

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 2*

**CONTENT STANDARDS**

**Visual Art**

**2.2** Create gesture and contour observational drawings.

**Life Science**

**LS2fe** Students know how sugar, water and minerals are transported in a vascular plant.

**I&E6a** Classify objects (e.g., rocks, plants, leaves) in accordance with appropriate criteria.

**ESSENTIAL QUESTIONS** (*Questions students might ask about the topic*)

- What is contour drawing?
- How did contour drawing help me learn more about leaves and their vein patterns?
- Why would leaves be considered “plant food factories”?
- How do I classify or sort leaves into three categories: palmate, pinnate and parallel?

**OBJECTIVES & STUDENT OUTCOMES** (*Students will be able to...*)

- Create a contour line drawings of three types of leaves: palmate, pinnate and parallel
- Become introduced to photosynthesis as a way to make food for plants
- Demonstrate knowledge of classification of leaves into three categories: palmate, pinnate and parallel

**ASSESSMENT** (*Various strategies to evaluate effectiveness of instruction and student learning*)

- **Feedback for Teacher**
  - Informal assessment of student skill by observation
- **Feedback for Student**
  - Informal verbal feedback from teacher
  - Direction and suggestions from individual conferences throughout work process

**WORDS TO KNOW**

**Visual Art Vocabulary**

- **Contour drawings:** The drawing of an object as though the drawing tool is moving along all the edges and ridges of the form.
- **Observational drawing skills:** Skills learned while observing firsthand the object, figure or place.
- **Pantograph:** an instrument for copying a drawing or plan on a different scale by a system of hinged and jointed rods.
- **Stylus:** a hard point or implement used for engraving and tracing

**Life Science Vocabulary**

- **Classification:** The process by which scientists identify and organize objects and organisms, such as plants.
- **Classify:** To identify and organize objects according to similar properties or other criteria.
- **Palmate:** A leaf vein pattern in which there are several veins that all start at one point near the base. The veins look like fingers of a hand.
- **Parallel:** A leaf vein pattern in which the veins are straight lines all running in the same direction.
- **Photosynthesis:** The process by which green plants make sugar from carbon dioxide and water in the presence of light.



- **Pinnate:** A leaf vein pattern that looks like a feather. There is one main vein that has smaller veins branching off sideways from it.
- **Vein:** Bundles of xylem and phloem in tubes and seen as lines (often raised lines) in leaves.

### MATERIALS

- variety of leaves, at least one pinnate, one palmate and one parallel
- 12" x 18" white construction paper, one per student
- fine or medium felt tip marker, one per student
- Chart paper, white board or document camera
- Science notebooks, one per student

### RESOURCES

- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 2*
- *Portfolios Grade Five*, by Robyn Montana Turner, Barrett Kendall Publishing
  - Drawing
    - Sketchbook: page 3
    - Details: pages 6 & 7
    - Leaves: page 95
- Internet Sites:
  - Contour Line Drawings
    - *Blind Contour Drawing:* <http://www.kinderart.com/drawing/blind.shtml>
    - *Blind Contour Drawing Lesson:* <http://bartelart.com/arted/blindcontour.html>
    - *Blind Contour Drawing:* <http://site.xavier.edu/colbornh/Assignments/Blind%20Contour%20Line%20Drawing%20Lesson%20Plan.pdf>
  - Leaf Images
    - Pinnate: <http://www.botany.hawaii.edu/faculty/webb/bot311/bot311-00/Leaves/OlonaLvs.jpg>
    - Palmate: <http://www.dftrees.com/Websites/dftrees/Images/Marmo%20Maple%20Leaf.jpg>
    - Parallel: <http://www.haltonhelps.org/Egardening/PID/morphology/parallel.JPG>
  - Observational Drawing
    - *Observation Drawing:* <http://people.goshen.edu/~marvinpb/lessons/rabbit.html>
    - *Helping children Sketch and Draw from Observation:* <http://illinoispip.org/lesson-planning/drawing.htm>
  - Pantograph
    - *What is a Pantograph:* <http://en.wikipedia.org/wiki/Pantograph>
    - *How to make a pantograph:* <http://users.hubwest.com/hubert/mrscience/pantograph.html>

### PREPARATION *(To be completed prior to the lesson)*

- Collect a variety of each type of vein pattern leaf: pinnate, palmate and parallel. This may be the same gathering of leaves as listed in *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 2, Step 2*.
- Have enough leaves for each student to have at least one leaf at a time.
- *FOSS Kit Grade 5, Life Science: Living Systems, Investigation 2, Part 2* should be completed before this lesson.
- *Read and discuss FOSS Science Resources Grade 5, pages 105 and 106.*

### WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

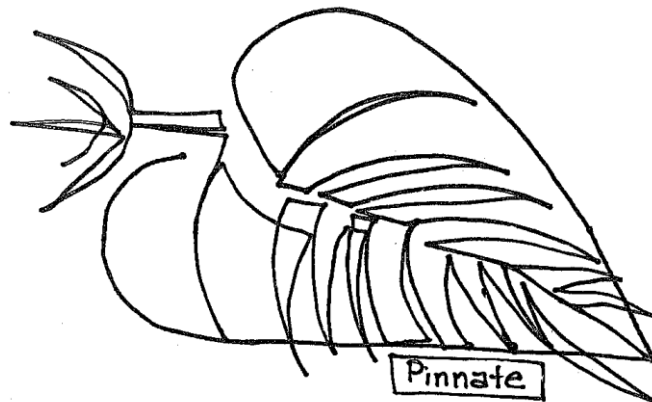
- Separate students into groups of 3 or 4.
- Distribute bags of leaves with at least 2 different pinnate, 2 different palmate and 2 different parallel leaves to each grouping of students.
- Say:
  - *Let us recall how we **classified** leaves into categories according to the patterns of the **veins**.*
  - *What are the three patterns called?* [pinnate, palmate, parallel]
- Ask:

- *Who can describe what **pinnate** leaf pattern looks like?* [A leaf vein pattern that looks like a feather. There is one main vein that has smaller veins branching off sideways from it.]
- *Who can describe what a **palmate** pattern looks like?* [A leaf vein pattern in which there are several veins that all start at one point near the base. The veins look like fingers of a hand.]
- *Who can describe what a **parallel** pattern looks like?* [A leaf vein pattern in which the veins are straight lines all running in the same direction.]
- **Say:**
  - *In your groups **classify** the leaves in your bag into **pinnate**, **palmate** and **parallel** pattern categories.*
  - *Each student needs to take part in this activity. Take turns choosing one leaf from the bag and placing it into a category.*
  - *Do this silently.*
- Allow students 1 to 2 minutes to complete this task.
- **Say:**
  - *Take a minute or two to discuss each grouping to make sure you all agree on the **vein** pattern **classification** of all the leaves in your bag.*
- Go to each group as they are discussing their **vein** pattern **classification** to check for accuracy.

**MODELING** (*Presentation of new material, demonstration of the process, direct instruction*)

- Instruct each student to take at least one leaf back to his or her individual workspace.
- Distribute one 12" x 18" piece of white construction paper and a fine or medium felt tip marker to each student.
- Demonstrate how and instruct students to create a **contour line drawing**.
- **Say:**
  - *Today we are going to create a special type of **observational drawing**.*
  - *This kind of drawing is called a **contour line drawing**. Some people call this type of drawing a "blind" **contour line drawing** because we are not going to look at the lines we are creating, only at the object we are drawing.*
  - *Place your drawing paper on the side of your workspace that coincides with your writing hand. If you are right handed, place the drawing paper to your far right side. If you are left handed, place the drawing paper to your far left side.*
  - *Place the object you are going to draw, in this case one of the leaves, to the far opposite side of your workspace. If you are right handed, place the leaf on your far left side. If you are left handed, place the leaf on your far right side.*
- Set up your demonstration workspace in this way.
- Write the following three statements on a chart paper, white board or place under document camera:
  - Look only at the leaf, never at your paper.
  - Create one continuous line.
  - Move your eyes and your hand slowly.
- Show the demonstration of a **pantograph** from: <http://en.wikipedia.org/wiki/Pantograph>
- **Say:**
  - *This machine is called a **pantograph**. Part of the machine has a stylus that the artist uses to trace the illustration while the other part of the machine has a pencil or marker and draws exactly what is being traced. Let's watch the video again.*
  - *Notice that this **pantograph** is calibrated to copy the illustration larger than the original.*
  - *Now imagine that your eyes are the same as the **stylus** and your hand holding the marker is the same as the marker in the **pantograph**.*
- Demonstrate by placing your left hand pointer finger by your eye and putting your right hand pointer finger out to the side. Stiffen your upper body, then move upper body in space from waist.
- **Say:**
  - *Notice that the line my right hand would be creating is exactly the same line as where my eye is moving.*
  - *Making a "blind" **contour line drawing** is very similar.*
  - *Watch as I demonstrate.*
  - *I am placing the marker in my writing hand and placing it on the paper.*

- *Now I am turning my head toward the leaf.*
- Begin by looking at the space where the stem joins to the leaf.
- Say:
  - *My eyes are now moving along the edge of the leaf very slowly.*
  - *My marker is moving in the exact same manner, very slowly copying what I am seeing never lifting the marker from the surface of the paper creating one continuous line.*
- Continue to demonstrate creating the outline of the leaf. When your eyes have gotten back to the spot where you began visually tracing the leaf, say:
  - *Continue to watch and try to decide what I am looking at now.*
- Keep your marker on the paper.
- Begin to move your eyes down the **veins** in the leaf and continue to draw in the same manner.
- When you have demonstrated for at least 2 minutes, stop and see what you have created.

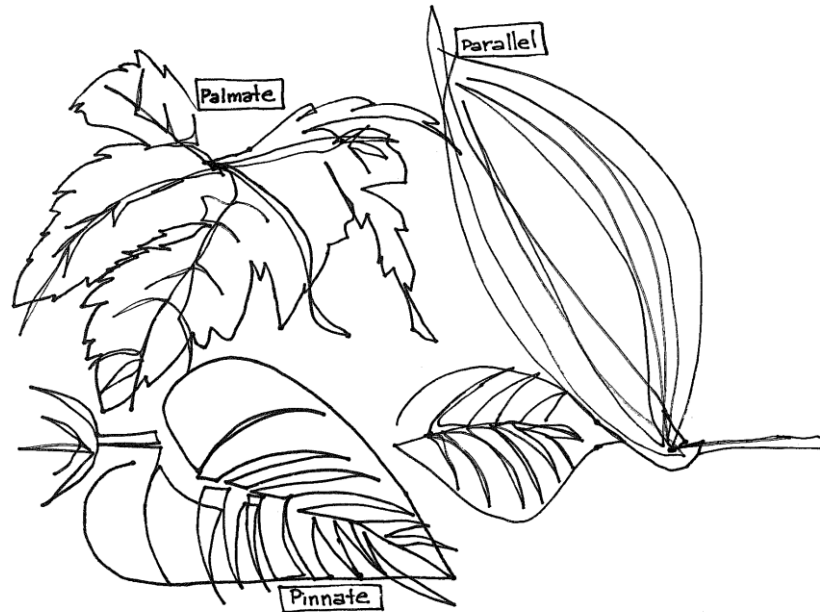


- Check that all students have their work areas set up properly.

**GUIDED PRACTICE** (*Application of knowledge, problem solving, corrective feedback*)

- Instruct students to create a “blind” **contour line drawing** of their first leaf during a 1-minute time period.
- Move throughout the room encouraging students to keep their eyes on the leaf and not on their drawing paper. This is really challenging for most students.
- Reinforce the importance of following the written directions:
  - Look only at the leaf, never at your paper.
  - Create one continuous line.
  - Move your eyes and your drawing hand slowly and in the same pathway.
- Allow students to see what they created. Allow students one minute to share their attempts with a neighbor.
- Instruct students to set up their workspace again and place their marker in a different place on the drawing paper.
- Instruct students to create another “blind” **contour line drawing** of the same leaf over a 90 second period.
- Allow students 1 minute to discuss the similarities and differences with a different neighbor.
- Exchange leaves, making sure students have a different type of **vein** pattern.
- Instruct students to create a “blind” **contour line drawing** of this leaf on a different area of the drawing paper.
- Some drawings may overlap onto previously drawn images, but continue to use the same drawing paper.
- When this drawing is done, exchange leaves again making sure students have the third kind of **vein** pattern to observe.
- Allow 2 minutes for this contour line drawing.

- When three types of **vein** patterns have been drawn, allow students the opportunity to write **pinnate**, **palmate** and **parallel** next to the appropriate drawings.



**DEBRIEF & REFLECT** (*Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?*)

- Instruct students to stand up in a circle around the room holding their “blind” **contour line drawings**.
- Say:
  - *When it is your turn, point to the leaf drawing that is your best attempt at not looking at your drawing paper. It probably will not be the best drawing, but should be the one in which you looked at the leaf the longest and the least at your paper.*
  - *Tell us what kind of **vein** pattern it is.*
- Model this directive and then give each student a chance to talk about his or her work.
- Science Notebook Prompt: How did creating a **contour line drawing** help me learn more about leaves and their **vein** patterns?

**EXTENSION** (*Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.*)

- Create mats or simple baskets from woven parallel leaves (palm or grass).
- Use “blind” contour line drawing as a warm up before students begin any type of observational drawing.



Pinnate Leaves

<http://www.biologie.uni-hamburg.de/b-online/library/webb/BOT311/Leaves/BasicLeafTermDicots.htm>



Palmate Leaves

<http://www.dftrees.com/Websites/dftrees/Images/Marmo%20Maple%20Leaf.jpg>



Parallel Leaves  
[www.studyblue.com](http://www.studyblue.com)



Blind Contour Line Drawing of Potted Plant  
[http://farm3.static.flickr.com/2041/2230321305\\_f7d0e7b9fa.jpg](http://farm3.static.flickr.com/2041/2230321305_f7d0e7b9fa.jpg)